

Estuarine Hypoxia: The Mobile Bay Perspective

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Abstract

Mass migrations of motile epifauna (e.g., crabs and demersal fish) up onto the shore of Mobile Bay have been documented in the popular literature since the mid-1800s. These events, referred to popularly as “jubilees,” are now known to be a result of the movement of parcels of hypoxic and anoxic bottom waters towards shore caused by the winds and tides. Recent research has shown that these hypoxic/ anoxic waters are caused by high rates of oxygen consumption at the sediment surface combined with extremely strong salinity stratification in the water-column that effectively isolates the bottom water from oxygen available in the surface waters. For Mobile Bay, these factors serve to create an environment that is hypoxic approximately 50 percent of the time during the summer period. There does not appear to be a long-term trend (either positive or negative) in the duration of these low-oxygen events. Rather, the frequency and duration of hypoxia/ anoxia is related to short-term variations in the physical structure of the water-column. Despite the frequency of these events, fisheries landings in Mobile Bay remain high and researchers are now addressing the question of whether such events (that may help maintain highly productive “pioneer” communities) may have a beneficial effect on secondary production in the ecosystem.

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Presentation Discussion

John Pennock (Dauphin Island Sea Lab—Dauphin Island, AL)

Don Boesch (*University of Maryland—Cambridge, MD*) asked the speaker if he could estimate how many of the Gulf’s estuarine systems are at a stage where additional nutrient input would enhance useful production.

John Pennock replied that there are many systems, especially pristine grass bed systems, which presumably could sustain more plankton production. However, theoretically, those nutrient inputs could have a negative, as well as positive, effect on the grass beds. He said that more turbid systems, for example Delaware Bay, can sustain nutrient inputs better than many of the cleaner water systems on the Gulf.

Clive Walker (*Natural Resources Conservation Service—Texas A&M University*) stated that they used plots of fertilizer application versus corn production to demonstrate the threshold of benefit from fertilizers. These plots are very similar to the nutrient versus estuarine productivity plots shown in the presentation.

John Pennock said that these two concepts were very similar and it was necessary to link these concepts to resolve both the farmers’ and the marine fisheries’ issues.